

## IN THE CLAIMS:

Cancel claims 5, 14-16, 18, 21-25, 27-29 and 32, all inclusive without prejudice.

Please amend the claims as shown below.

1        1. (Currently amended) A system for accelerating the  
2 solution of treatment gas into a liquid stream, said system being  
3 adapted to receive and maintain said stream under pressure, said  
4 system comprising:

5            an aspirating injector comprising a body having an  
6 axial passage, a converging section, a throat section and a  
7 diverging section in said passage in that order, an injector port  
8 through said body entering said throat section and adapted to  
9 receive treatment gas to be dissolved in said liquid stream, said  
10 passage having an inlet port to receive said stream, and an  
11 outlet port;

12           a collider and a reactor, each having an inlet port and  
13 an outlet port, the inlet port of one of them being connected to  
14 the outlet port of the injector, its outlet port connected to the  
15 inlet port of the other and; a fluid release receiving said  
16 stream from said last mentioned outlet port for releasing the  
17 treated stream from the system while maintaining the system under  
18 pressure.;

19           said collider comprising a body forming a chamber, a  
20 pair of nozzles opposing one another, said stream being divided

21 so a portion flows through each said nozzle with their streams  
22 flowing toward and meeting one another in said chamber, said body  
23 having an outlet port exiting the chamber. ; said outlet  
24 comprising the exit for all of the stream which entered said  
25 chamber.

1           2. (Original) A system according to claim 1 in which said  
2 fluid release comprises a gas/liquid separator which separates  
3 and releases the stream's liquid and the stream's gases which  
4 remain undissolved in said liquid.

1           3. (Original) A system according to claim 2 in which said  
2 fluid release further includes a regulator valve for the liquid  
3 stream.

1           4. (Original) A system according to claim 2 in which said  
2 separator is a centrifugal separator.

1           5. (Cancelled) A system according to claim 1 in which said  
2 collider comprises a body forming a chamber, pair of nozzles  
3 opposing one another, said stream being divided so a portion  
4 flows through each said nozzle with their streams flowing toward  
5 and meeting one another in said chamber, said body having an  
6 outlet port exiting the chamber.

1           6. (Currently Amended) A system according to claim ~~5-1~~ 1 in  
2       which said portions of said stream intersect at an included angle  
3       not larger than 90 degrees.

1           7. (Currently Amended) A system according to claim ~~5-1~~ 1 in  
2       which said portions of said stream are axially aligned, and in  
3       which said exit port exits the chamber laterally, midway between  
4       said nozzles.

1           8. (Currently Amended) A system according to claim ~~5-1~~ 1 in  
2       which each of said nozzles includes a converging section, and  
3       twisting vanes in said converging section whereby to impart a  
4       rotary motion to the outer region of the stream as it flows  
5       through the nozzle.

1           9. (Currently Amended) A system Apparatus according to claim  
2       1 in which said reactor comprises a body having a central axis  
3       with an internal cylindrical wall forming an axial internal  
4       cylinder, its said inlet port adapted to receive said stream, and  
5       its said outlet port adapted to discharge said stream with an  
6       increased dissolved amount of said treatment gas therein, said  
7       inlet port and said outlet port being centrally located on said  
8       central axis;

9           a nozzle in said inlet port directing said stream  
10 axially into said cylinder;

11           a partial barrier extending laterally across said  
12 cylinder dividing said cylinder onto a first chamber and a second  
13 chamber, said barrier having an upstream face facing into said  
14 first chamber and axially facing said nozzle, and a downstream  
15 face facing into said second chamber and facing said outlet port;

16           said upstream face having a concave circular first  
17 reflecting surface centered on said central axis and facing said  
18 nozzle, the radius of said reflecting surface being smaller than  
19 the internal radius of said internal cylindrical wall;

20           a plurality of axially extending arcuate blades, each  
21 having an outer wall closely fitting to said internal cylindrical  
22 wall, a dimension of radial thickness, and an inner wall  
23 concentric with its said outer wall, said blades having axially-  
24 extending side walls, said blades being angularly spaced from one  
25 another to provide an equal number of axial slots between them;

26           a cove surface circularly surrounding said first  
27 nozzle, extending to said inner walls of the blades and to their  
28 intersections with said slots, whereby said stream discharges  
29 from said nozzle so a major portion of it strikes said reflecting  
30 surface, which reverses a major portion of the flow to the cove  
31 surface which in turn reflects a major portion of said flow  
32 toward said barrier along said blades and in said slots, said

33 partial barrier being pierced between with slots between said  
34 slots to provide for flow from said first chamber into said  
35 second chamber, thereby to pass said flow from the first chamber  
36 into said second chamber, said outlet port discharging from said  
37 second chamber.

1 10. (Currently Amended) A system ~~Apparatus~~ according to  
2 claim 9 in which said second chamber comprises a partial barrier  
3 facing toward said outlet port, a plurality of blades and slots  
4 as in said first chamber, said slots in the first and second  
5 chamber being rotationally displaced from one another, whereby to  
6 form joggle shoulders encountered by portions of the stream  
7 flowing across the barriers, said second chamber including a cove  
8 receptive of some of the flow across the barrier to reflect at  
9 least some of the flow of the stream to the barrier in said  
10 second chamber, which in turn reflects it to said outlet port.

1 11. (Currently Amended) A system ~~Apparatus~~ according to  
2 claim 10 in which said fluid release comprises a gas/liquid  
3 separator which separate and releases the stream's liquid and the  
4 stream's gases which remain undissolved in said liquid.

1 12. (Currently Amended) A system ~~Apparatus~~ according to  
2 claim 3 in which said fluid release comprises a gas/liquid

3 separator which ~~separate~~ separates and releases the stream's  
4 liquid and the stream's gases which remain undissolved in said  
5 liquid.

1 13. (Currently Amended) A system ~~Apparatus~~ according to  
2 claim 11 in which said separator is a centrifugal separator.

1 14. (Cancelled) Apparatus according to claim 10 in which  
2 said collider comprises a body forming a chamber, pair of nozzles  
3 opposing one another, said stream being divided so a portion  
4 flows through each said nozzle with their streams flowing toward  
5 and meeting one another in said chamber, said body having an  
6 outlet port exiting the chamber.

1 15. (Cancelled) Apparatus according to claim 14 in which  
2 said portions of said stream intersect at an included angle not  
3 larger than 90 degrees.

1 16. (Cancelled) Apparatus according to claim 14 in which  
2 said portions of said stream are axially aligned, and in which  
3 said exit port exits the chamber laterally, midway between said  
4 nozzles.

17. (Currently Amended) A system for accelerating the

1 solution of treatment gas into a liquid stream, said system being  
2 adapted to receive and maintain said stream under pressure, said  
3 system comprising:

4 an aspirating injector comprising a body having an  
5 axial passage, a converging section, a throat section and a  
6 diverging section in said passage in that order, an injector port  
7 through said body entering said throat section and adapted to  
8 receive treatment gas to be dissolved in said liquid stream, said  
9 passage having an inlet port to receive said stream, and an  
10 outlet port;

11 a collider comprising a body forming a chamber having  
12 an inlet port and an outlet port, said inlet port being connected  
13 to the outlet port of the injector, its outlet port being  
14 connected to a fluid release receiving said stream from said last  
15 mentioned outlet port for releasing the treated stream from the  
16 system while maintaining the system under pressure-; said  
17 collider comprising a body forming a chamber, a pair of nozzles  
18 opposing one another, said stream being divided so a portion  
19 flows through each said nozzle with their streams flowing toward  
20 and meeting one another in said chamber, said body having an  
21 outlet port exiting the chamber, said outlet comprising the exit  
22 for all of the stream which entered said chamber.

1 18. (Cancelled) A system according to claim 17 in which said

2 collider comprises a body forming a chamber, pair of nozzles  
3 opposing one another, said stream being divided so a portion  
4 flows through each said nozzle with their streams flowing toward  
5 and meeting one another in said chamber, said body having an  
6 outlet port exiting the chamber.

1 19. (Currently Amended) A system according to claim ~~18~~ 17  
2 in which said portions of said stream intersect at an included  
3 angle not larger than 90 degrees.

1 20. (Currently Amended) A system according to claim ~~18~~ 17  
2 in which said portions of said stream are axially aligned, and in  
3 which said exit port exits the chamber laterally, midway between  
4 said nozzles.

1 21. (Cancelled) A system for accelerating the solution of  
2 treatment gas into a liquid stream, said system being adapted to  
3 receive and maintain said stream under pressure, said system  
4 comprising:

5 an aspirating injector comprising a body having an  
6 axial passage, a converging section, a throat section and a  
7 diverging section in said passage in that order, an injector port  
8 through said body entering said throat section and adapted to  
9 receive treatment gas to be dissolved in said liquid stream, said



10 passage having an inlet port to receive said stream, and an  
11 outlet port;

12 a reactor having an inlet port and an outlet port, the  
13 inlet port being connected to the outlet port of the injector,  
14 its outlet port connected to a fluid release receiving said  
15 stream from said last mentioned outlet port for releasing the  
16 treated stream from the system while maintaining the system under  
17 pressure.

1 22. (Cancelled) A system according to claim 21 in which  
2 said fluid release comprises a gas/liquid separator which  
3 separates and releases the stream's liquid and the stream's gases  
4 which remain undissolved in said liquid.

1 23. (Cancelled) A system according to claim 22 in which  
2 said fluid release further includes a regulator valve for the  
3 liquid stream.

1 24. (Cancelled) Apparatus according to claim 21 in which  
2 said reactor comprises a body having a central axis with an  
3 internal cylindrical wall forming an axial internal cylinder, its  
4 said inlet port adapted to receive said stream, and its said  
5 outlet port adapted to discharge said stream with an increased  
6 dissolved amount of said treatment gas therein, said inlet port

7 and said outlet port being centrally located on said central  
8 axis;

9 a nozzle in said inlet port directing said stream  
10 axially into said cylinder;

11 a partial barrier extending laterally across said  
12 cylinder dividing said cylinder onto a first chamber and a second  
13 chamber, said barrier having an upstream face facing into said  
14 first chamber and axially facing said nozzle, and a downstream  
15 face facing into said second chamber and facing said outlet port;

16 said upstream face having a concave circular first  
17 reflecting surface centered on said central axis and facing said  
18 nozzle, the radius of said reflecting surface being smaller than  
19 the internal radius of said internal cylindrical wall;

20 a plurality of axially extending arcuate blades, each  
21 having an outer wall closely fitting to said internal cylindrical  
22 wall, a dimension of radial thickness, and an inner wall  
23 concentric with its said outer wall, said blades having axially-  
24 extending side walls, said blades being angularly spaced from one  
25 another to provide an equal number of axial slots between them;

26 a cove surface circularly surrounding said first  
27 nozzle, extending to said inner walls of the blades and to their  
28 intersections with said slots, whereby said stream discharges  
29 from said nozzle so a major portion of it strikes said reflecting  
30 surface, which reverses a major portion of the flow to the cove

31 surface which in turn reflects a major portion of said flow  
32 toward said barrier along said blades and in said slots, said  
33 partial barrier being pierced between with slots between said  
34 slots to provide for flow from said first chamber into said  
35 second chamber, thereby to pass said flow from the first chamber  
36 into said second chamber, said outlet port discharging from said  
37 second chamber.

1 25. (Cancelled) Apparatus according to claim 24 in which  
2 said second chamber comprises a partial barrier facing toward  
3 said outlet port, a plurality of blades and slots as in said  
4 first chamber, said slots in the first and second chamber being  
5 rotationally displaced from one another, whereby to form joggle  
6 shoulders encountered by portions of the stream flowing across  
7 the barriers, said second chamber including a cove receptive of  
8 some of the flow across the barrier to reflect at least some of  
9 the flow of the stream to the barrier in said second chamber,  
10 which in turn reflects it to said outlet port.

1 26. (Currently Amended) A collider receptive of two streams  
2 of a gas/liquid stream to accelerate the solution of the gas into  
3 the liquid, said collider comprising:

4 a body forming a chamber, pair of nozzles opposing one  
5 another, said stream being divided so a portion flows through

6 each said nozzle with their streams flowing toward and meeting  
7 one another in said chamber, said body having an outlet port  
8 exiting the chamber, each of said nozzles includes a converging  
9 section, and twisting vanes in said converging section whereby to  
10 impart a rotary motion to the outer region of the stream as it  
11 flows through the nozzle.

1 27. (Original) A collider according to claim 26 in which  
2 said portions of said stream intersect at an included angle not  
3 larger than 90 degrees.

1 28. (Original) A collider according to claim 26 in which  
2 said portions of said stream are axially aligned, and in which  
3 said exit port exits the chamber laterally, midway between said  
4 nozzles.

1 29. (Cancelled) A collider according to claim 26 in which  
2 each of said nozzles includes a converging section, and twisting  
3 vanes in said converging section whereby to impart a rotary  
4 motion to the outer region of the stream as it flows through the  
nozzle.

1 30. (Original) A reactor receptive of a stream of liquid  
2 and bubbles of treatment gas, for accelerating the solution of

3 said gas in said liquid, said reactor comprising:

4 a body having a central axis with an internal  
5 cylindrical wall forming an axial internal cylinder, its said  
6 inlet port adapted to receive said stream, and its said outlet  
7 port adapted to discharge said stream with an increased dissolved  
8 amount of said treatment gas therein, said inlet port and said  
9 outlet port being centrally located on said central axis;

10 a nozzle in said inlet port directing said stream  
11 axially into said cylinder;

12 a partial barrier extending laterally across said  
13 cylinder dividing said cylinder onto a first chamber and a second  
14 chamber, said barrier having an upstream face facing into said  
15 first chamber and axially facing said nozzle, and a downstream  
16 face facing into said second chamber and facing said outlet port;

17 said upstream face having a concave circular first  
18 reflecting surface centered on said central axis and facing said  
19 nozzle, the radius of said reflecting surface being smaller than  
20 the internal radius of said internal cylindrical wall;

21 a plurality of axially extending arcuate blades, each  
22 having an outer wall closely fitting to said internal cylindrical  
23 wall, a dimension of radial thickness, and an inner wall  
24 concentric with its said outer wall, said blades having axially-  
25 extending side walls, said blades being angularly spaced from one  
26 another to provide an equal number of axial slots between them;

27           a cove surface circularly surrounding said first  
28 nozzle, extending to said inner walls of the blades and to their  
29 intersections with said slots, whereby said stream discharges  
30 from said nozzle so a major portion of it strikes said reflecting  
31 surface, which reverses a major portion of the flow to the cove  
32 surface which in turn reflects a major portion of said flow  
33 toward said barrier along said blades and in said slots, said  
34 partial barrier being pierced between with slots between said  
35 slots to provide for flow from said first chamber into said  
36 second chamber, thereby to pass said flow from the first chamber  
37 into said second chamber, said outlet port discharging from said  
38 second chamber.

1           31. (Original) A reactor according to claim 30 in which  
2 said second chamber comprises a partial barrier facing toward  
3 said outlet port, a plurality of blades and slots as in said  
4 first chamber, said slots in the first and second chamber being  
5 rotationally displaced from one another, whereby to form joggle  
6 shoulders encountered by portions of the stream flowing across  
7 the barriers, said second chamber including a cove receptive of  
8 some of the flow across the barrier to reflect at least some of  
9 the flow of the stream to the barrier in said second chamber,  
10 which in turn reflects it to said outlet port.

1           32. (Cancelled) A reactor according to claim 31 in which  
2 said fluid release comprises a gas/liquid separator which  
3 separate and releases the stream's liquid and the stream's gases  
4 which remain undissolved in said liquid.

1           33. (New) A system according to claim 17 in which each of  
2 said nozzles includes a converging section, and twisting vanes in  
3 said converging section whereby to impart a rotary motor to the  
4 outer region of the stream as it flows through the nozzle.